groups of animals a distribution of forms exists, such that the higher are found nearer the centre of the great land masses that radiate from the North Pole; the lower towards the ends of continents and the islands reaching down into the watery waste of the southern hemisphere. This sequence of form he now explains by an interesting view. The natural selection of individuals does not depend upon their protective or adaptive qualities, but upon their good or bad constitutions. If an insect-eating bird gets upon the track of a set of caterpillars, it is unlikely to distinguish between the slight variations they may have in protective colouration. But in the struggle between race and race, the race better protected will, on the whole, attract the attention of enemies a less number of times. The selection between individuals is a selection between the generally strong and the generally weak, between those whose life-pulse beats high and those of low vitality; not between those with an organ or an adaptation a shade weaker or stronger. The appearance of the differences between races which tend to the adaptation of some and the non-adaptation of others are due to causes independent of selection. Thus it happens that in cases where there is a wide range there are more varied local conditions, more local races, and a greater material for that competition between races which is the cause of progress. And thus where continents spread widely evolution is more rapid than in the confined areas which stretch towards the South Pole. This view is complicated by the further view that the result of crossing is not a production of variation by the mingling of characters, but an equalisation of the divergent characters of individuals.

Those who are interested in controversy will find these and a number of most interesting views and collections of facts in Dr. Haacke's book. But they are so entangled with elaborate and chiefly mathematical arguments against the views of Weismann, that they form somewhat difficult reading for the uncontroversially disposed. Moreover, they are complicated by a highly elaborate theory of Dr. Haacke's own invention. He accepts the view of Verworn that the nucleus is an organ of metabolism for the cell, and sees in the plasma with the centrosome as its organic centre, the true bearer of heredity. The plasma is composed of ultimate elements called "gemmæ." These are rhombic prisms, the ultimate shape of which is as proper to protoplasm as are the shapes of inorganic crystals to their chemical compositions. These "gemmæ" are built up into "gemmaria" by association into variously shaped layers and rods. The shape of the "gemmaria" determines the shape of the whole organism, and a number of ingenious references of symmetry to hypothetical gemmarial structures are given. The "gemmaria" of a whole organism are identical, and by a system of attractions and repulsions remain in a condition of equilibrium. But outer forces acting upon any part of the organism disturb this system of equilibrium until the organism settles down into a new position of equilibrium. As the germ cells contain gemmaria like all the gemmaria of the body, outer changes cause a new condition of equilibrium in them, and this new condition naturally is the starting-point of the new organism. The differences between individuals are chiefly differences between the degrees of closeness in which the gemmæ of "gemmaria" are attached to each other. Those with weak attachment have weak constitutions, and in each generation are weeded out. In sexual union, the primary cause of which is the attraction between similar crystalline systems, the inequalities of attachment between the gemmæ are redressed.

It is perhaps unnecessary to add that Dr. Haacke considers that acquired characters are inherited, but that it is absurd to expect any proof of this inheritance, as, he says, the whole organic world is a proof of it, and because without it epigenesis would be impossible.

P. C. M.

AGRICULTURAL ENTOMOLOGY.

Handbook of the Destructive Insects of Victoria. (Prepared by order of the Victorian Department of Agriculture.) By C. French, F.L.S., Government Entomologist. Part II. (Melbourne: 1893.)

TWENTY notorious insect pests are dealt with in this volume, each being illustrated by a coloured plate, which shows not only the metamorphoses of the insect, but the nature of the mischief of which it is the cause. The chapter on each insect is complete in itself, and there is no definite order of treatment of subjects; nor in a volume of this character was any such sequence called for. Arranging the insects systematically, however, it is found that the Homoptera are represented by the green peach aphis, the black peach aphis, the orange aphis, the grape louse, the cabbage aphis, the cottony-cushion scale, the oleander scale, the lemon scale, and the red scale of the orange; the Coleoptera by the plum curculio, the cherry green beetle, the apple root-borer, and the strawberry beetle; the Lepidoptera by the orange moth, the case-moth of the orange, the vine moth, the silver-striped vine moth, the potato moth, and the cabbage moth; and the Neuroptera by the so-called "white ant," *Termes australis*, Hagen. With three or four exceptions, therefore, most of the insects dealt with are pests of fruit trees, and not more than half a dozen of them have acquired notoriety in England.

As the main object of the work is to supply to growers information as to the means whereby they may protect their crops against the ravages of injurious insects, we naturally look for very full information under this head, and it must be admitted that the author has admirably acquitted himself in this respect. In addition to the concise details of methods of prevention and of remedy given under the head of each pest, there is a well-illustrated appendix, containing descriptions of the various kinds of apparatus which are coming more and more into use for insecticidal purposes. Several appreciative references are made to the ingenious English-made spraying machine known as the "Strawsonizer"; but the light knapsack modifications of this apparatus, termed the "Antipest" and "Notus" respectively, are of too recent introduction to find a place in the volume. The list of insecticide materials given in the first volume of the work is supplemented here by a further series. Moreover, as part i. contained a list of the insectivorous birds of Victoria, so part ii. contains a list of the fruit and grain eating birds of the colony. We are glad, also, to note

©1894 Nature Publishing Group

the many references to insectivorous insects; for it is quite as important that a cultivator should know what insects to protect and encourage, as to recognise those which it is to his advantage to suppress. Several of the coloured plates afford illustrations of the insect foes of insect pests, and not merely of the familiar hymenopterous parasites, but of such friends to the cultivator as the species of Syrphus which devours the cabbage aphis, and of the Australian ladybird, a species of Novius, which orange-growers both in Australia and in California have found so effective an ally in keeping their groves free of the dreaded cottony-cushion scale, *Icerya Purchasi*, Maskell.

In noticing the first part of this work we appealed to the author to add to its international value by appending in every case the authority for the systematic name. We are glad that Mr. French has been able to adopt this suggestion. The agricultural entomologists of the United States are great offenders in this respect; indeed, they sometimes give no systematic names to the injurious insects which are made the subjects of their bulletins, whilst they not infrequently coin trivial names which are certainly not elegant, though they may be expressive. Hence it becomes difficult to know with any degree of certainty what is the precise species referred to; confusion consequently arises, and the bulletin has only a local value. In connection with the trivial names themselves, there is room for improvement. For instance, in the volume before us, descriptions are given of the "green peach aphis" and the "black peach aphis"; but as it is the aphis and not the peach to which the colour refers, the names "peach green aphis" and "peach black aphis" would be more descriptive. This is no mere quibble, for in the volume itself the principle is conceded in the name of the "cherry green beetle." In the year 1892, when *Plutella cruciferarum*, Zell.—an insect described in this volume as the cabbage moth—wrought tremendous destruction amongst the cruciferous crops of England and Scotland, the newspapers teemed with descriptions of the ravages of the "diamond-back turnip moth." This naturally led to inquiries, perhaps ludicrous, as to the nature of diamond-back turnips; but our Board of Agriculture set a good example by describing the pest in an official leaflet as the "turnip diamond-back moth," and thus reverting to the name by which John Curtis made the insect familiar half a century ago.

We welcome this second instalment of a valuable publication, and trust Mr. French may be encouraged to bring to a successful conclusion a work of the highest economic importance to agriculturists and horticulturists.

OUR BOOK SHELF.

Proceedings of the Edinburgh Mathematical Society. Vol. i. Session 1883. (London: Williams and Norgate, 1894.)

FROM time to time we have noted the annual volumes of this Society from vol. ii. to vol. xi., which appeared last year. The volume before us fills up a lacuna and now makes the series complete. In the early days of the Society the publication of *Proceedings* was not contemplated, and when an access of members rendered publication possible, the cost of printing absorbed the major part of the funds, and each session's subscriptions have only sufficed for the current session's volume. Some few years since a special appeal was made and funds sufficient to warrant publication obtained. The result is the admirable piece of geometrical work before us. For, in fact, the volume is almost entirely one man's work. The first president was Dr. J. S. Mackay, whose edition of Euclid for the Messrs. Chambers in 1884 gave ample evidence that there was an elegant and specially learned geometer in our midst. The article on "Euclid" in the *Encyclop. Britannica* confirmed this discovery. It has been long known that Dr. Mackay had large stores of notes, and we are glad to find that he has found an outlet for much of this interesting matter. At the second meeting of the Society the president read a paper on the triangle and its six scribed circles. A portion of this paper was given in abstract in vol. ii., and was considerably enlarged in vol. xi., under the heading "History of the Nine-point Circle." In the long interval, with the permission of the Council, Dr. Mackay has amassed a collection of notes, divided into twenty sections, filling more than 1600 quarto pages of manuscript. A selection has been made which most nearly corresponds with what was actually communicated to the Society in 1883. The nine-point circle is accounted for above. The sections embraced in the present instalment treat of the centroid, the circumcentre, the incentre, the excentres, the orthocentre, Euler's line, relations among the radii, and area. They occupy pp. 6–128, and are accompanied by sixty-eight lithographed figures. Each property is traced back, as far as can be ascertained, to the first discoverer, the author having had the assistance of French, German, and Belgian mathematicians in addition to the aid of personal friends in Great Britain. The result is a rich repertory of almost, if not quite, all that is known on the special points indicated above.

We sincerely hope that Dr. Mackay may be recouped for the vast amount of work he has gone through, and the expense to which he has been put, by an appreciative and purchasing audience. This will encourage him to put his remaining notes into the hands of some publisher, or possibly he may adopt the present mode of publication.

The only other paper is a collection of notes on Plücker's first equation connecting the singularities of curves, by Dr. C. G. Knott. These are printed in the form in which they were handed over to the committee eleven years ago.

The Starry Skies. By Agnes Giberne. (London: Seeley and Co., 1894.)

THIS small book will be found a very useful addition to the series in which it is published. It is written in a clear and intelligible style, and should just suit those young readers who wish to obtain some of the more elementary ideas about the world on which we dwell, the moon, and the planetary and stellar systems in general. Great tact seems to have been shown throughout in the choice of suitable examples for giving the reader a good mental grip of distances, sizes, shapes, &c., of the heavenly bodies, without over-burdening his or her mind with too much detail. The clear print and the not too liberal use of dark type render the book very pleasant reading, while the questions and answers at the conclusion of each chapter will be serviceable. The illustrations throughout are very good indeed; the majority of them being excellent reproductions from the more or less important recent photographs. Among them we recognise Roberts' Andromeda nebula, the Pleiades, a fine Orion picture, cluster in Hercules, and several others nearly equal in quality. As a book for the young, we can heartily recommend these pages on the starry skies.

W. J. L.

©1894 Nature Publishing Group